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PENDING CLAIMS AS OF DECEMBER, 2002 - SERIAL NO. 09/846,066

1. An electrode, comprising:
an electrically conductive matrix containing a disulfide group, wherein an S-S bond of the disulfide group is cleaved by electrochemical reduction and reformed by electrochemical oxidation; and
a plurality of carbon nanotubes being dispersed in the electrically conductive matrix.
2. An electrode of claim 1 wherein the electrically conductive matrix contains an electrically conductive polymer and an organic compound having the disulfide group.
3. An electrode of claim 2 wherein the electrically conductive polymer comprises a polymer represented by a formula:
$$-[Ar-NH]_n-$$
 wherein Ar is aryl, and n is an integer.
4. An electrode of claim 2 wherein the electrically conductive polymer comprises polyaniline.
5. An electrode of claim 2 wherein the organic compound contains a 5 to 7 membered, heterocyclic ring containing 1 to 3 heteroatoms consisting of a nitrogen atom and a sulfur atom.
6. An electrode of claim 2 wherein the organic compound contains a thiadiazole ring.
7. An electrode of claim 1 wherein the electrically conductive matrix contains an electrically conductive polymer having the mercapto group which is capable of forming disulfide group.
8. An electrode of claim 1 wherein the electrode contains 0.5 to 6 percent by weight of the carbon nanotubes based on a sum of the electrically conductive matrix and the carbon nanotubes.
9. An electrode of claim 1 wherein the electrode contains 1 to 4 percent by weight

of the carbon nanotubes based on a sum of the electrically conductive matrix and the carbon nanotubes.

10. An electrode of claim I wherein the carbon nanotubes have an average diameter of 3.5 to 200 nanometers and an average length of 0.1 to 500 micrometers.
- II. An electrode of claim I wherein the carbon nanotubes have an average diameter of 5 to 30 nanometers and an average length of 100 to 10000 times the diameter thereof.
12. A battery precursor, comprising:
 - (a) a cathode having:

an electrically conductive matrix containing a disulfide group, wherein an S-S bond of the disulfide group is cleaved by electrochemical reduction and reformed by electrochemical oxidation; and

a plurality of carbon nanotubes being dispersed in the electrically conductive matrix;

and
 - (b) a cathode current collector;wherein the cathode is coated onto the cathode current collector,
13. A battery precursor of claim 12 wherein the cathode current collector and the cathode have a layered structure.
14. A battery precursor of claim 12 wherein the cathode has a thickness ranging from 5 to 500 micrometers.
15. A battery precursor of claim 12 wherein the cathode has a thickness ranging from 10 to 100 micrometers.
16. A battery precursor of claim 12 wherein the cathode current collector has a sheet configuration.

17. A battery precursor of claim 12 wherein the cathode current collector comprises a metallic foil.
18. A battery precursor of claim 12 wherein the electrically conductive matrix contains an electrically conductive polymer and an organic compound having the disulfide group.
19. A battery precursor of claim 18 wherein the electrically conductive polymer comprises a polymer represented by a formula:
$$-[\text{Ar-NH}]_n-$$

wherein Ar is aryl, and n is an integer.
20. A battery precursor of claim 18 wherein the organic compound contains a 5 to 7 membered, heterocyclic ring containing 1 to 3 heteroatoms consisting of a nitrogen atom and a sulfur atom.
21. A battery precursor of claim 12 wherein the electrically conductive matrix contains an electrically conductive polymer having the mercapto group which is capable of forming the disulfide group.
22. A battery precursor of claim 12 wherein the cathode contains 0.5 to 6 percent by weight of the carbon nanotubes based on a sum of the electrically conductive matrix and the carbon nanotubes.
23. A battery precursor of claim 12 wherein the carbon nanotubes have an average diameter of 3.5 to 200 nanometers and an average length of 0.1 to 500 micrometers.
24. A lithium battery, comprising:
 - (a) a cathode having:
an electrically conductive matrix containing a disulfide group, wherein an S-S bond of the disulfide group is cleaved by electrochemical reduction and reformed by

electrochemical oxidation; and

a plurality of carbon nanotubes being dispersed in the electrically conductive matrix;

(b) an anode having an active material for releasing lithium ions; and (c) an electrolyte being disposed between the cathode and the anode.

25. A lithium battery of claim 24, further comprising:

(d) a cathode current collector contacting with the cathode; and (e) an anode current collector contacting with the anode.

26. A lithium battery of claim 25 wherein the cathode current collector, the cathode, the electrolyte, the anode, and the anode current collector have a layered structure and are laminated each other in this order.

27. A lithium battery of claim 24, wherein the electrolyte comprises at least one of a solid electrolyte and a gel electrolyte.

28. A lithium battery of claim 24 wherein the electrically conductive matrix contains an electrically conductive polymer and an organic compound having the disulfide group.

29. A lithium battery of claim 28 wherein the electrically conductive polymer comprises a polymer represented by a formula:



wherein Ar is aryl, and n is an integer.

30. A lithium battery of claim 28 wherein the organic compound contains a 5 to 7 membered, heterocyclic ring containing 1 to 3 heteroatoms consisting of a nitrogen atom and a sulfur atom.

31. A lithium battery of claim 24 wherein the electrically conductive matrix contains an electrically conductive polymer having the mercapto group which is capable of forming

disulfide group.

32. A lithium battery of claim 24 wherein the cathode contains 0.5 to 6 percent by weight of the carbon nanotubes based on a sum of the electrically conductive matrix and the carbon nanotubes.
 33. A lithium battery of claim 24 wherein the carbon nanotubes have an average diameter of 3.5 to 200 nanometers and an average length of 0.1 to 500 micrometers.
 34. A lithium battery of claim 24 wherein the cathode has a thickness ranging from 5 to 500 micrometers.
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